



**MISSOURI**  
**DEPARTMENT OF**  
**NATURAL RESOURCES**

**Introductory Message**

I am pleased to present the 2014 Missouri Nutrient Loss Reduction Strategy. This strategy reflects the collaborative efforts of this department, its many partners at state and federal agencies and, more importantly, partners from the agricultural sector and from communities across the state. This is a practical plan that builds upon those partnerships that have proven to be so successful over the last decade. The plan's credibility is built on the experience of all of those who contributed.

Missouri has a long history of facing up to its environmental challenges. For thirty years, the people of Missouri have supported a one-tenth of a cent sales tax with half the funding going toward helping our farmers implement best management practices that save our soils and reduce the loss of sediment and nutrients to our streams and lakes. Over a decade ago, Missouri had properly permitted all of its large animal agriculture operations and ensured that those operations had and followed their nutrient management plans. Through the efforts of those who put these plans into practice, Missouri's farms remain productive and our waters are cleaner.

Missourians continue to innovate and this strategy includes some more recent creations. Through Our Missouri Waters, the state is supporting watershed-based planning for water quality and quantity that gives local stakeholders the leading role in choosing their future actions. Our Community Services efforts are focused on helping small communities without abundant technical resources get access to the information and expertise they need to create implementable plans for meeting the needs of their communities while protecting water quality. Missouri signed and is implementing a precedent-setting agreement with EPA, the City of Columbia, Boone County and the University of Missouri to use Collaborative Adaptive Management to address water quality issues in the Hinkson Creek Watershed. Our land grant university is a leader in examining potential energy crops and how to sustainably grow our energy future with a greatly reduced environmental footprint. It combine research at the highest level with education and extension to bring the best science and practices to Missourians.

This strategy addresses the incredible diversity of Missouri watersheds, hydrology, soils, landscapes, agricultural practices and communities. It offer a breadth of options for those in every corner of the state and, by providing a catalog of possible strategies grouped by activity, offers an easy way for interested Missourians to shop for ideas that may apply to their activities, to find the partners who can help them understand their best options and to put the most suitable of these nutrient loss reduction practices to work.

This strategy is adaptive. We have more to learn about nutrient sources, loading and transport. We have more to learn about the effectiveness of many of these practices under the specific conditions found different parts of Missouri. Thus this strategy provides an easy method to update the practices and the information related to them. Because of the partnerships on which this strategy was build, no Missourian will have to travel far to get the information needed to contribute to our efforts. Community leaders and landowners will be able to learn the latest by reading this document or visiting the

department, their local Soil and Water District office, USDA office or University of Missouri Extension office.

I want to thank all of those who contributed to the development of this strategy. The combined expertise its authors provide clear and practical guidance for protecting farmland, reducing nutrient loading of our lakes and streams, and providing Missourians and our downstream neighbors a healthier environment.

**Forward: How to use this Strategy**

The Missouri Nutrient Loss Reduction Strategy serves a number of purposes and thus is designed to meet the needs of multiple audiences. The strategy contains explanations of the science and policy that form the basis for this strategy and the mechanics of how the strategy was constructed. For those land owners and communities that want to know what they might do to reduce nutrient loss, Appendix A contains the proposed actions, their expected impacts on water quality and potential partners in implementing those actions.

**Policy Section** – The section spells out the policy basis for Missouri’s strategy for reducing nutrient loss to our rivers, lakes and streams. It explains the broad vision behind these efforts. It also provides a framework for putting Missouri’s efforts into a Mississippi Basin strategy to reduce nutrient delivery to the Gulf of Mexico. Finally, it contains a summary of Missouri’s work to date to reduce nutrient loss through efforts of our farmers, communities and state and federal agencies.

**Strategy development** – This section explains how this strategy was developed and the main drivers behind its development. It contains an explanation of watershed-based planning and adaptive management and how each will be applied to this effort. This section also explains how individual actions were selected for incorporation into this strategy.

**Actions:** This strategy is based on realistic, documentable actions that were recommended by the experts in each area together with those who actually implement the actions. This section provides an overview of each proposed action and the scope of implementation expected in the next five years.

**Expected Water Quality Results:** By combining the proposed actions with the best available estimates of the resulting nutrient loss reductions, this section explains the results expected within the next five years. It also provides an outlook for future reductions.

**Next Steps:** The goal of this strategy is to provide a pathway for implementation of the actions needed to reduce nutrient loss to our waterways. This section focuses on the necessary steps, the expected challenges and our strategies to overcome those challenges. Keys to these efforts are both education and coordination among the many groups that will contribute to protecting our water quality.

**Appendix A:** For those most interested in potential actions, Appendix A provides the critical information about the actions, potential partnerships and where to get help in implementing an action to reduce nutrient loss.

## **Executive Summary**

The Missouri Nutrient Loss Reduction Strategy is based on the implementation of multiple best management practices and actions over the past decade, new ideas that we incorporate into this strategy and the best science available on the efficacy of the proposed actions. We propose a set of actions that should improve water quality in Missouri while contributing to reducing nutrients moving downstream through the Mississippi River to the Gulf of Mexico.

In creating this strategy, we were led by the desire to create a practical strategy that contained reasonable, implementable goals for the next few years. We adopted an adaptive management approach that recognizes the need for greater understanding of the impacts of the proposed actions on water quality and also on those who implement these actions. We accept that we have much to learn about reducing nutrient loss to our stream and lakes and the additional benefits and challenges to doing so. We acknowledge the current uncertainties in important federal policies, but make our best effort to lay our actions that should work. By creating a strategy whose actions were recommended by those most knowledgeable and most involved in implementing the actions, we expect that this strategy will have credibility with those most important to its success.

The strategy was built through a collaborative effort of many different entities. It builds upon partnerships that have been established and are thriving. It draws upon the expertise of those working on both point source and non-point sources of nutrients.

The great diversity of Missouri landscapes, streams, soils, communities and agricultural practices led the authors to create a document that provided multiple options for reducing nutrients. By offering a breadth of actions, we expect that the strategy will contain one or more actions that will be applicable to almost any farm community or business that wishes to reduce the flow of nutrients to our waters.

This strategy has two main audiences. First, for those interested in policy, the strategy provides a roadmap for reducing nutrients lost to our waters and lays out expectations for doing so. More importantly, it provides a single place for those who wish to contribute to this effort to find a suite of potential practices for them to consider and to find the experts who can help identify the best applicable practices and to implement them. For many of the actions proposed, this strategy explains where funding is available to help defray the cost of implementing the practice.

The greatest difficulties in implementing this plan are the need for education and funding as well as uncertainties in the effectiveness of some practices under the wide variety of conditions found in Missouri's watersheds. The strategy designed to inform farmers, community leaders and citizens of the actions that each can take to reduce nutrient flows into our waters. Missouri has benefitted from the sales tax that supports its Soil and Water Conservation Program, but more farmers need to become aware of the potential for technical and financial assistance through their local Soil and Water Conservation District and USDA and University of Missouri Extension Offices. The State Revolving

Fund has provided grants and low interest loans to communities across Missouri to upgrade their wastewater systems, but a huge backlog of needs remains. Finally, we need better data that support both the benefits and potential problems with many of these actions in order to encourage more Missourians to implement these actions where appropriate.

The first part of this strategy outlines the background for creating and implementing this strategy. It documents the rationale for creating the strategy, how the strategy was created and documents how it can be used by Missourians.

The document summarizes the actions or practices themselves and their implementation. These practices were selected by the topical experts who have been engaged in implementing these or similar actions in Missouri.

Overall implementation strategies and activities and expected measurable results follow, illustrating that this strategy is designed to create a meaningful improvement in water quality while supporting Missouri's farmers, businesses and communities.

The appendices provide a method for all Missourians to look for specific actions that might be implemented in their community, on their farm or in their yard. These appendices are arranged for easy searching and include not only a description of the action or practice, but also its applicability and those who can help landowners choose the best practice or suite of practices for them and to help implement the chosen practices.